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Memoranda

upon

the nature and value

of Materials

as also on Labour in

Canada

from information in the

Office of

The Commanding R.E. Engineer

1841

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Command'g. Royal Engineer Office
Head Quarters Montreal 1st April 1841

Considering it expedient that the Officers of Engineers, Clerks and Foremen of Works should as soon as possible after their arrival in this Country, be made acquainted with the nature and prices of Materials generally used in the several districts in this extensive command as well as the price of Labour.
Lieut.t Colonel Oldfield caused certain queries to be put to the several Clerk of Works in the Canadas. Their replies in a condensed form are now circulated for the information of the Departments.

Masons and Bricklayers Materials

Stone
Madawaska Little Falls

The stone at the Little Falls resembles the common black stone of Quebec and being very slaty splitting into thin laminæ is not at all calculated for any building exposed to at-

atmospheric action? There is no building stone nearer than Lake Temiscouta.

Degelé

The remarks upon Building Materials at the Little Falls will apply to the Degelé in the absence of any further information

Lake Temiscouta

Lime Stone for building can be mined at the side of the Lake opposite the Barracks.

Riviere du Loup

Lime Stone can easily be procured at this place of sufficiently good quality for common Building purposes.

Quebec

The building Stone found in the neighbourhood of Quebec is of different kinds.

1st The common black rock or clay slate on which the Citadel is built. This Stone contains a good

decay of stone, will not bear exposure to the weather, and consequently although formerly extensively used is now only resorted to by the poorer classes, when used by them it is generally plastered or clapboarded on the outside.

2nd The Beauport stone; the quarries of which are from 4 to 6 miles from Quebec, This stone is a blue lime stone, and is found in strata from 2 to 5 inches thick, and though much used by the Habitans it never is by this Department as the walls of which it is built are generally damp.

3rd The Auge Gardien Stone is a compact sand Stone found 12 miles below Quebec on the left bank of the river in strata from 2 to 5 inches thick and is used for arches. A few quarries supply a similar stone to the latter in beds from 4 to 8 inches thick, but it does not stand long exposed to the weather A quarry has been very recently opened which appears to furnish

a superior material for rubble or hammer dressed masonry, in beds from 18 inches to 3 feet thick it splits very square both on the beds and face and requires but little additional work for hammer dress-ed masonry, but it is too hard to cut.

4th " A compact sand stone got at Chateau Richer about 15 miles below Quebec on the North shore in beds varying from 6 to 10 inches; this is a very good building material but it cannot be found in any large quantity.

5th " The Cap Rouge primitive trap stone, the quarries of which are very extensive and situated 7 miles above Quebec on the left bank of the St Lawrence is a very durable material and may be procured of large dimensions and in any quantity; the quarries are situated close to the river, and the stone much used by the Department where plain work only is required.

6th " Pointe aux Trembles silicious lime Stone, the quarries are situated

30 miles above Quebec and one mile from the left bank of the river. it can be procured in any quantity in courses from one to two feet high on the face and is employed by the Department in the construction of all superior works.

Three Rivers

There is no building stone at this station except broken granite in boulders found on the surface of the ground; it makes a very neat front, but it would be difficult to obtain a large quantity.

Montreal

The only building stone in the vicinity of Montreal is carbonated lime stone of an excellent quality fit for Masonry of every description. The first strata is full of vents and therefore will not bear cutting, but at the depth of six or seven feet where the second strata is gained, Ashlers of any size required can be obtained. Lime stone is to be found in some situations

situations on the surface but it is seldom used except for making lime or for Macadamizing.—

Chambly

Different kinds of stone are found here: that found in the field is a poor lime stone but very hard and containing Oxide of Iron; the stone found in the river is a hard sand stone; both kinds are fit for rubble work; but they will not bear the chisel.—

St. Johns

There is a kind of lime stone found in quarries three miles from this place; it is in thin laminated strata and is very ill adapted for building; any stone that may be required for important works at this place would have to be transported from Montreal or Laprairie. excellent lime Stone well calculated for all building purposes is brought to St. Johns from

from the Motte Island about twelve miles on the American side of the line 45°

Isle aux Noix

The stone used at the Isle aux Noix is generally procured from the Island of Motte

Sorel

No quarries have yet been opened at this place, the large boulders found on the surface are not adapted for building purposes.

Rideau Canal

By-Town Hartwell the Hogback the Black Rapids and Long Islands.
The country in the neighbourhood of these stations is formed of gray calcarious stone in beds from one to five feet deep; it splits well with plug and feather, cuts well for rubble work and produces lime of a good quality; with the exception of

of the upper courses which should be laid by for backing. the stone is well adapted for masonry of all kinds, The stone found at all the other Stations on the Canal is of the same description but harder; The quarry at Merrickville pro=-duces an excellent stone for Ashler work, it is easily quarried with crow bars and splits easily with plug and feather; good lime of a brownish colour is produced from this stone

Kingston Mills

The stone in this neighbourhood is granite covered with a blue lime stone and earth; the granite is only fit for backing for thick Walls the lime stone is well adapted for building; it however imbibes a good deal of moisture it makes excellent lime.—

Brewers Mills

Granite and other primatives are found here and a shaky sand stone at the upper mills; the stones are not good for building; those used in the Canal locks were brought from distances varying from three to Six miles, but are very

very difficult to work and much discoloured by the Oxide of iron.

Jone's Falls

Sand stone is abundant here but it is too shaky to work; the Ashlers for the locks which are coarse-coloured sand stones were brought from a distance of six miles from the first concession of South Gwillimbury, the quarries where this stone is got are at trifling elevations, have little covering and any required scantlings of sound Ashlers can be procurred from them, the stone when first quarried is very soft, and easily worked, but soon on exposure to the atmosphere becomes hard. Granite is found at Jone's Falls on the west side of the Canal, but no lime stone; that required for the Canal locks was brought from Ansleys Mills a distance of 2½ miles.—

Davis Mills, Chaffeys Mills and the Isthmus

The

The Rocks at these stations are of the primative Kinds, but the ashlers used in building the locks of the Canal had to be procured from quarries in the vicinity of those where the Ashlers were got for Isaac Falls, the stones had to be drawn to these stations distances varying from 7 to 14 Miles.

Narrows

The prevailing rock is [illegible] some of it is in large loose Rocks at the surface, in other places it lies in thin strata, it is difficult to quarry and ill adapted for building.—
With respect to the quarries along the whole line of the Rideau Canal it is to be observed, that their exploration is entirely the work of this Department when engaged in constructing the Canal.—

Kingston and its vicinity—

The stone common to this place and it vicinity is Limestone, it is of various

various shades, Vert, slate, blue and grey. In the Township of Pittsburgh and in the locality of Kingston Mills granite in large masses is found under a strata of limestone; granite has also been found under limestone at Point Henry and other places in the neighbourhood of Kingston. A soft stone of a faded blue colour is found above granite at Kingston Mills and Point Henry; it is totally unfit for building but makes a very good hydraulic lime.

The limestone although of a very brittle nature is well calculated for building, being very durable easily quarried and worked. Ashlers with suitable beds for courses not exceeding 18 inches high can be easily procured, but beyond that limit the stones deteriorate; the grey lime stone is the hardest and most durable and should invariably be used in the exterior faces of walls being more free from the defective veins, (disignated dues) crossing the layers or beds than the other specimens of lime stone; these veins are so minute that they cannot always be detected tell after the stone is worked.

worked and set, which renders stones with these defects very unfit for copings as the wet and frost splits them in those places: stone of this kind should always be laid on its natural bed and should never be used in places where it would be exposed to the action of great heat, as it splinters immediately on fire coming in contact with it. Kingston and its immediate vicinity is almost one mass of lime stone, and being found on the surface it is seldom quarried to a greater depth than 12 or 14 feet. The granite found in the neighbourhood is admirably adapted for the exposed faces of works of defence as it does not split when struck with a shot as is the case with limestone, but as yet it has been very little used on account of the great expense of quarrying and working it when compared with lime stone —

Toronto

These

The only Stone to be found in the neighbourhood are stones known in Toronto as "Lake Stones" and the Granite boulder stone"; the former are composed of the greywacke, or light blue siliceous lime Stone, lying in beds varying from 3 to 10 inches in depth interposed with the sand rock of the Coal formation; these stones are not well adapted for building, as from their laminated nature, they do not yeild to the hammer without splintering into horizontal fragments neither are they fit for the chisel, but as a great portion of them have good natural faces, and flat beds they are well suited for rubble work; the granite boulders of course are ill adapted for building; the Lake stones are procured out of the shallow waters of the lake as well as along the edge of the bank for several miles towards Oakville; the beds of this stone visible in calm weather are six in number, laying nearly horizontal, some of the beds when exposed to the united action of the lake and the atmosphere moulder into clay; the procuring of this stone in large quantities would from its being

under

under water involve considerable difficulty and expense; On the right bank of the Humber about two miles from its estuary there is the appearance of a quarry of the same discription of stone just alluded to, apparently of better quality being in larger and thicker beds and high up in the face of the bank out of the reach of the water; the distance however of these quarries from Toronto is 4 miles.—

Flamborough

The stone for Ashlar and other cut-work used at Toronto is generally procured from Flamborough distance 49 miles, 45 of which has a water conveyance, it is a good sand stone and easily wrought

Queenston

A similar stone to that found at Flamborough is procurable at Queenston, tho' what has been obtained from the Military reserve there for the new Barracks now being built at Toronto is extremely hard and difficult to work both with the hammer and stone cutters tools. Halfway between Queenston and St Davids on the ridge of hills terminating on Queenston heights a stone is found which it is asserted resists the

action

action of fire. and is frequently used in backs and jambs of Fire-places. This stone appears to be a species of Granite, containing a portion of lime as it effervescies on the application of a strong acid, It can be supplied in lengths for Chimney jambs from 4 to 5 feet and 1'. 8" wide and in slabs for Backs of Chimnies or hearths 6'. 2". It is capable of being worked to a smooth surface and of being polished. The Kingston lime stone has been used in some of the Public buildings at Toronto. A sand stone might be procured in the Township of Esquising about 35 miles from Toronto but it is not much used in the neighbourhood of the latter place.

Hamilton

Both Lime stone and sand stone are to be procured here in great abundance of good quality and in good workable beds; both are well adapted for building, but the sand stone is preferable. The Lime stone and the sand stone are both found in quarries in the face of the mountain ridge, the former laying above the latter.

Penetanguishene

Lime stone and granite are both found in abundance on the Islands in Lake Huron in the vicinity of this post: the former is of three kinds the upper is a carbonate of Lime, the second is a dark blusish colour stone in beds of about 6 inches thick and the third is a silicious lime stone, the latter bed would furnish the best building stones but the difficulty of getting at it is a great objection to using it: it is considered that the first strata would furnish either ashlers or rubble of sufficient size and quality for any building or work that might be required

Niagara

Any building stone that might be wanting at any time at this station will have to be procured from Queenston, 7 miles distant, where excellent sand and lime stone is to be had in abundance, both kinds of stone are found in quarries only a few feet under the surface and are well adapted for either rubble or ashler work.—

Granite

Drummondville

Granite and a kind of free stone is found at this place; the latter is well adapted for rubble work but does not bear the chisel; the granite is both expensive to quarry and difficult to work.

Chippawa and Lyon's Creek

There is no building stone to be found nearer than Drummond-ville a distance of 3 miles.-

Fort Erie

Abundance of excellent lime stone is to be found 3 miles from the Old Fort; also good building stone similar to the Drummond-ville stone; the lime stone is found in quarries near the surface, is well adapted for rubble masonry but it is rather too hard to cut or dress.

London

London

The nearest quarry to this place is 4 miles distant where very good lime stone can be had either for rubble or Ashler work, but as the road to the quarry is very bad, the best time for collecting the stone is during the sleighing. In the immediate vicinity of the Town the only stone found is lime and sand stone in boulders from 3 to 14 inches in dimeter ill calculated for building.

St Thomas

Boulders similar to those at London are found at St Thomas.

Aonhestbugh

Abundance of excellent lime stone fit for building is found in quarries near the Town.

Sandwich

Sandwich Windsor & Chatham.

It is reported that no Stone calculated for building is found in the vicinity of these places.—

Bricks

Madawaska Degele and Temiscouta

The Bricks used at these Stations are at present procured from Riviere du Loup a port on the St. Lawrence 36 miles from Temiscouta.—

Quebec

Quebec

Brick earth of a very good quality is found in this neighbourhood and would no doubt if properly worked produce durable bricks; the few bricks that at present are made here by the Habitans are of the very worst discription.—

Plain tiles have lately been made by a Potter which appear to be of a tolerably good quality

Three Rivers

Common place bricks can be obtained here in summer time in any quantity and very cheap.

Montreal

Very good materials for making bricks are found in this vicinity some of which requires more sand than others; but the bricks produced can only be denominated tolerable

and

and this must be the case till the English system of brick making is adopted.

Chambly

With the exception of sand, abundance of brick making materials can be procured here, but on account of the difficulty of getting sand no use is made of them.

St. Johns

The materials for brick making at this post are good, and considerable quantities of bricks are made here of middling quality, more care is required in making and burning

La prairie

Good materials for brick making are found here but no bricks have yet been made of them.—

Sorel

Sorel.

A short distance from this place materials are found of which indifferent bricks have been made.—

Ile Aux Noix

Good materials for brick making are found in this neighbourhood, and bricks have been made at a place 6 miles off.——

Coteau du Lac

A few bricks have been made here; good materials can be procured in the neighbourhood

Stations on the Rideau Canal.

Tolerably good materials for making bricks can be procured along the whole line of the Canal, and bricks have been made at By-town, Long Island and Smiths falls but they do not stand well

well the effects of the frost; it is more than probable that if the brick manufactories in the Canadas were superintended by experienced hands from home, as good bricks generally speaking would be produced as are to be found in most places.—

Kingston

Good materials for brick making are found here as well as at Waterloo and Long Island, and brick have been made at these Stations, but like other places in Canada of an inferior kind to what might be obtained if the materials were properly worked

Toronto

Good brick clay is to be procured in every direction in this neighbourhood, and some good bricks are made here; the brick clay in the vicinity of the New Barracks varies from 12 to 18 inches in thickness and

and is found close to the surface, that found at the east end of the City and towards the north is in beds varying from 3 to 4 feet in thickness, all the bricks made at this place when properly burnt are of a cherry red colour. The bricks made at Toronto are owing to the want of coal badly burnt, it is imagined from successful experiments made in the United States, that Anthracite coal could be used with great advantage in making bricks.—

Hamilton

Good meterials for brick making are found here, and some good brick have been made with them, but here as well as at other places the proper brick making process is not adapted.—

Penetanguishene

In 1831 good materials were raised and bricks made with them for the new Barracks, but it does not appear that any bricks have been made

made at this place since that date, those made at that time were not of a very good quality owing to the materials not being exposed to the action of the atmosphere before being worked up and to their not being properly burnt.—

Niagara

There are very good materials for brick making at this place, at present 500,000 bricks are annually made here.—

Queenston

There is good brick clay about a mile from the Village where a considerable quantity of bricks are now made.—

Drummondville

Tolerably good materials for brick making are found here, but as there is little demand for bricks very few are made.

Chippawa

Chippawa and Lyons Creeks

Any bricks required for these Villages are brought from Drummondville a distance of 3 miles.

Port Erie

Plenty of good brick clay is found here, but very few brick as yet have been made. —

London

The clay is not of the best quality brick making is however carried on to some extent, about 250.000 are said to be made annually.

St Thomas

The materials for brick making at St Thomas are said to be good, but few bricks are made there being little demand for them. —

Amherstburgh

Amherstburgh

The materials good and abundand, and many bricks are made at this place, The same may be said of at Sandwich Windsor and Chatham

General Observations

The clay from which it is proposed to manufacture bricks in Canada should be dug some time before acquired for use and exposed as much as possible to atmospheric action especially during Winter.
It would be a great advantage to use a proportion of coal ashes in manufacturing bricks In London (England) not less than 720 bushels of coal ashes are used for 100,000 bricks and it should be well kneaded up with the clay, The absence of this material is the probable cause of why the bricks are so unequal, being sometimes unusually hard, and at other times so absorbent as to crumble to pieces from the

action

action of the weather, bone ashes however are not easily procured in Canada, and are particularly scarce on the upper part of the Provinces.

Lime and Sand

Kadawaska Little Falls

Lime cannot be procured nearer than Temiscouta; if any considerable quantity was required it might be burnt there but if only a small quantity was wanted it would be cheaper to get it from Riviere du Loup.

Sand is procured from a small island near the falls.

The Degele

Lime must be procured from Temiscouta and Riviere du Loup. Sand from the immediate neighbourhood

Temis-couta

Lime

Lime can be burnt on the spot or be procured from Riviere du Loup. Sand from the Lake shore.—

Quebec.

Lime can be obtained in any quantity at Beauport from 5 to 6 miles distant on the north shore below Quebec, it is of various qualities. The lime from the Concessions St. Michael and St. Thomas, is that generally used by the Department it is of very good discription and much resembles the Dorking lime of England. And sand is procurable in any quantity from the River St. Charles about 1/4 mile from the Citadel.—

Three Rivers

Lime and Sand can be obtained at this Station without difficulty.—

Montreal

Lime can be procured here on

any

any quantity of excellent quality. The sand in this neighbourhood is bank and pit, but it is not fit for masonry or Brick work, it however from its soft loamy character answers very well for plastering; the sand used for building at this place is brought from the South side of the St. Lawrence very little of good quality can be got on the north side near the City.—

Chambly

The lime required for this place has to be brought from Montreal; the only sand found here is very coarse river sand

St. Johns

The lime used at this station is brought from [illegible]adie and can be obtained in any quantity. The sand found there is bank

and

and pit, very coarse and loamy.

Laprairie

The lime used here is also brought from Lacadie. Abundance of good river sand is to be had at this post.

Sorel

Lime can be obtained here in any quantity, and of a good quality. The sand of this place is too fine for Masonry or Brick work, but it answers very well for plastering mortar.—

Ile aux Noix

The lime used here is brought from Lacadie. River sand is procurable.—

Coteau du Lac

Lime is to be had in any quantity from an Island opposite this Station very good river and pit sand is found in

in the vicinity of this place.—

Rideau Canal from By-town to the first Rapids.

The lime produced from the calc-
-carious stone in the neighbour-
-hood of these Stations is consider-
-ed of a good quality. The quarries
opened for the work of the Canal
produced stone easily burnt.
The mortar made from this lime
takes a long time to harden, and
is a very bad water cement.
An excellent river sand is found
about 4 miles from By-town in
the bed of the river Gattineau a
little below the rapids and first
falls. a good quality of pit sand
is also found near By-town.
Generally speaking the land is
of a sandy nature in the neigh-
-bourhood of the Canal stations
and a tolerable good building
sand can be obtained at these
places.—

Kingston Mills and Brewers Mills

The

The stone at Kingston Mills makes excellent lime; the lime stone for Brewers Mills has to be brought from Ansleys mills and from the termination of the eastern ridge distance varying from 3½ to 5 miles. A chrystaline lime stone is found at the upper mills but it is difficult to burn. it however forms a good white lime.

Jones's Falls

No lime stone is to be found in the vicinity; such as was required for the Canal lock was brought from Ansleys mills a distance of 2½ miles land carriage and 18 miles water carriage.

Davis Mills Chaffeys Mills Isthmus and Narrows

The lime used in the construction of the works at these stations was made from a chrystaline lime stone which abounds at Chaffeys Mills. Davis Mills and on the shore of the Mud

Mud Lake about half a mile west of the lock at the Isthmus.

Kingston Mills

Excellent sand is procured from a pit on the reserve at this place it is of different degrees of fineness, the coarsest being lowest and the raising of it much impeded by the Water.

Brewers Lower Mills

At Brewers Lower Mills, the sand bank is in the wilderness about half a mile from the lock, it is of very indifferent quality being too fine and rather loamy; there is no sand of good quality at Brewers Upper mills the sand required for the locks had to be brought from the shores of Dog-hallee a distance of from 7 to 10 miles.

Jones Falls

The sand at Jones Falls is too fine for Masons Work, that required in the construction of

of the Canal was procured from the east shore of round Lake the latter being heavy & an excellent quality.

Davis's Lock

The sand for Davis's lock was also procured from this place, sand is found in abundance at Chaffeys near the lock, and is of various qualities.

Isthmus

The sand pit at the Isthmus is about a quarter of a mile from the lock, and is of various qualities.—

Narrows.

Good water washed sand may be procured in small quantity a little to the north of the Lock

Kingston

Good lime similar to the chalk lime of England is easily obtained at this place, the best is made from the

the dark blue stone, the proportion commonly used for mortar are two parts of lime to one of sand. River and pit sand can be obtained here in any quantity, but the nearest place good river sand can be obtained at is Cataraque Creek a distance of 3½ miles.—

Toronto

No pure carbonic lime stone is to be got here, the lime stone used is generally obtained from Kingston a distance of 180 miles (Water conveyance) it is burnt at Toronto; but may be brought from Queenston or Hamilton, both places being distant about 45 miles of which 42 miles has a Water conveyance the other 3 miles being over land. Very good river sand can be got at Toronto in any quantity.—

Hamilton

Lime of a good quality is easily procured

procured here, the quarries being but a short distance from the town; a very good sand for building is found on the edge of Burlington bay.—

Penetanguishene

Abundance of good lime made from stones found on the surface, or from the Island before alluded to (at a distance of six miles) can be obtained here; good river, pit or bank sand can be got in any quantity.—

Niagara

Abundance of the best lime is to be had here, and very superior river sand.

Queenston

Good lime and sand can be got at this place in any quantity

Drummondville

Drummondville

Plenty of good lime can be procured at a short distance, and also bank and pit sand but good river sand has to be brought a distance of 3 miles.—

Chippawa Lyon's Creek and Fort Erie

Good lime and river sand can be had at those places in great abundance.

London and St. Thomas

Lime and sand of a good quality can be procured at London as also at St. Thomas.—

Amherstburg

Lime and sand can readily be procured at Amherstburg and of an excellent description

Sandwich

No

No lime can be had nearer than Amherstburg, excellent sand can be obtained

Windsor

No lime can be procured nearer than Amherstburg, good river sand is to be had within 3 miles of Windsor

Chatham

No lime can at present be procured nearer than Amherstburg good pit sand may be procured on the spot.

Plasterers Materials

Laths - can be readily procured in all parts of the country, they are made of Cedar or Pine the former is preferable, they are sold in bundles of 120 each at from nine pence to fifteen pence per bundle, Lath nails are to be purchased at almost all the country stores, Hair, is to be had at any of the tan yards, which are to be met with in all parts of the country, it is sold at the rate at from three to four half pence per pound.

Cements

Quebec

In 1839 experiments were tried on the black stone found at Quebec with the view of obtaining a cement. That obtained from this stone resembled the Harwich both in colour and properties, it set hard under water, but it proved not to stand exposure to the winter weather; it was very expensive in burning and grinding. It appears the Harwich cement remains hard in pointing but seperates from the stone in winter.
An oil Cement proposed by Mr Blacklock prepared as follows has stood the winter very well.
No 1 28 lbs of white lead, 28 lbs of fine sand dried and sifted, 28 lbs of stone dust dried and sifted, 1 lb of litherage, 1/4 gallon of boiled linseed oil, 1 day of a Mason and 1/2 day of a Labourer.
No 2. 28 lbs of fine sand dried and sifted.

sifted, 28 lbs of stone dust dried and sifted 1½ gallon of boiled linseed oil, 1 lb of litherage Labour as above.
The stone dust is prepared from the walls of the Masons shed and with the sand must be quite free from moisture, the whole to be thoroughly incorporated and beaten with a wooden mallet till quite plastic, a small portion of either lamp black or ochre may be added to make the cement the exact colour of the stone.

Three Rivers

No natural cement is to be found here

Montreal

A stone has been found on the rising ground about a mile north of this City which when ground dry without being calcined makes a water cement.
No natural cements have as yet been discovered at the other stations in the Montreal district.

Stations

Stations on the Rideau Canal

About 1½ miles from By-town above the Chaudiere falls on the Ottawa River a quarry has been worked which produces a stone of a compact calcareous nature which when burnt and ground produces a cement that sets when mixed with one fourth sand. it however requires to be allowed time to set before water is brought into contact with it

Kingston

A cement is made at this station from a faded blue colour stone found above granite; it is burnt in a kiln like lime and ground in a mill; its quality is inferior to most of the water cements of England, it sets very slow and when used for pointing the joints of stone coping if it is rained on within 2½ hours after being used it will entirely wash out of the joints, its efficiency in such work depends upon its being well trowelled so as to present a glazed surface

surface. The proportion for use are two of cement to one of washed sand.

Toronto, Hamilton, Pencetang, Wishow and Niagara.

No natural cement-stone has as yet been discovered at these places.

Queenston, Drummondville, Chippawa, Port Erie London, St Thomas Amherstburg, Sandwich Windsor & Chatham.

No natural cement have as yet been discovered at these places.

As it is considered that Asphalt may be with advantage used in this Country for covering the Arches of Magazines and casemates, as well as for other purposes the following memoranda, relative thereto, principally extracted from the observations on the Asphaltic Mastic of Seyssel published by F. N. Simms Civil Engineer and Surveyor in 1838, is circulated for general information.

Asphalt

1. Is found in a mountain in the park of Pyrimont about 5 miles north of Seyssel, in the department de l'Ain in this immediate vicinity is also obtained a peculiar kind of mineral pitch, a species of bitumen, which, upon being mixed in the proportion of 7 of pitch to 93 of asphalt forms the mastic, or cement called asphalt.

2. The process of converting the raw material into the mastic is as follows. The Asphalt is brought to the spot as it

it is extracted from the mine, in large misshapen masses averag-ing about a cubic foot in content. The bitumen is brought from Py-renmont in casks and resembles mi-neral pitch of which it is a peculiar kind. The first process is to reduce the asphalt to powder, to facilitate which it is submitted to the oper-ation of roasting. This is done in a temporary furnace or oven, about 10 ft long and 3 ft broad; it consists of a trough about 10 inches deep the bottom being made of plate iron; the whole is set or formed into Brick-work the Asphalt is laid in the trough and a brisk fire made beneath the iron plate; a great evaporation takes place therefrom and the asphalt in about ½ an hour falls or is readily reduced to powder; by this process the mass loses about $\frac{1}{10}$ of its weight which evidently consisted of aqueous matter. after roasting it is passed through a

a sive whose meshes are about ¼
of an inch square. and that which
will not pass is reduced to powder
by a heavy mallet. the process of
melting is similar to that of Lead.
into each melting furnace or cauldron,
about 14 lbs of bitumen is first put.
which, when dissolved, taking great
care by stirring that it is not burned
the powdered Asphalt is to be added
gradually, to the extent of 186. pounds
and when these have been well mix-
-ed, the whole composition must be
suffered to get nearly liquid keeping
it constantly stirred, that none of
it may burn. otherwise it will be
deliorated in quantity; when this
is nearly fluid which will be in
about 1½ hour, a bucket-full of
very small clean gravel is to be
put into the mixture, this having
first been made very hot. the whole
Compound is then to be kept stirred
to mix it well, and as before to pre-
-vent its calcining, and when re-
-duced

reduced to a proper consistency, that is when it begins to be in ebullition or to simmer and rather more fluid than treacle it is fit for use: at this period it gives out a light white smoke, From the furnace it is conveyed in buckets to the moulds, The above are the details of the process employed for the pavement at the Place de la Concorde and it is precisely the same where the material is employed for roofs of buildings or any other work except that in such cases the clear small gravel is omitted: the mastic cement should always be laid on a well levelled or sloped bed of Concrete &c.

3, It requires a dry and level foundation to be prepared for it—concrete, powdered lime and Brick rubbish levelled and rammed, In the floors of the Rooms a foundation was made of the old Bricks laid on the flat and the Asphalte was only laid ½ inch thick but the thickness depends upon the hardship and wear it is to undergo, 1 inch would probably

be sufficient for the heaviest Carriages and even for Gun platforms. It is generally laid on in courses of about 2ft. 4 wide by nailing down on the foundation when it is prepared and the surface made level, two slips of wood of the thickness the asphalt is to be; it is then poured out of a ladle and levelled and spread by a straight edge run over the slips and another man sifts a little fine grit over and beats with a piece of wood; as it hardens another ladle full is then brought and poured out at the part where the last left off and spread as before when the breadth is completed the slips of wood are taken up and nailed down again as a guide for another breadth and thickness.

4.—A few minutes after the mastic has been spread in a fluid state it again takes its natural density which is such that at the heat of 100° of Fahrenheit it resists all impressions from an ordinary force. it is anti-elastic has the appearance of Granite when

within 3ft and upwards exempt
on account of fire, and is not
inflammable, the quantity of
Petrolit contains, being so very small
when employed in the Construction
of Water Tanks or reservoirs it imparts
neither taste, smell, or colour to
the water it contains — it possesses
the durability of the hardest stone,
and is wholly impervious to water,
it resists equally well both heat
and frost, it has been laid in the
pavements of Stables in Paris and
in 2½ years the Wooden feet had
made no impression on it, many
Artificial Asphalts have been
attempted but the Seyssel Asphalte
Edaridges patent is stated to be
the only one that has answered

5. Scale of prices for the Patent Asphalt of Seyssel is furnished in England

Superficial Feet	For flooring or Footpavement ½ inch thick	For Stables. Coach Houses &c ⅜ inch thick	For Barn floors Carriage Drives &c ⅞ inch thick	For Roofs of Terraces Covering Arches lining Tanks Cisterns &c ½ in thick	Material
	£ s d	£ s d	£ s d	£ s d	
100 to 500	" 11	1 2	1 4	1 3	asphalt
500 " 750	" 10½	1 1½	1 3	1 2½	£7. per Ton
750 " 1.000	" 10	1 1	1 2	1 2	
1.000 " 2.000	" 9½	1 "	1 " ½	1 1	
2.000 " 3.000	" 9	" 11	1 "	1 "	Bitumen
3.000 " 5.000	" 8½	" 10	" 11½	" 11	£2. per Ton
5,000 upwards	"	Special	agreement		

Mem. 3393 feet Sup.ᵉ of Asphalte ½ inch thick were laid in the Queens Rooms Kings Inn in August 1832 at a Cost of 10½ per Sup.ᵉ foot, including Labour and all Materials. The average of 3 inches of the said Pavement thick, but one half the ground had the Coun- crete was laid Pavement thick, under it.

The following memorandum on the mode of applying the Bastenne Bitumen is from the Office of the Inspector General of Fortifications

The quantity of Bastenne Mineral Bitumen or Mastic required to cover 2076 superficial yards is about 35 Tons if laid half an inch in thickness this thickness is sufficient for foot pavements. Terraces, &c and may also be sufficient, or at the outside 3/4 inch for the proposed purpose of covering the Terreplein of the Redoubt at Point Henry, Kingston, provided it may not be necessary to move heavy Guns over it, from one part of the Redoubt to another in which case a thickness of 1 1/2 in or 1 1/4 in would be necessary

The Bitumen should be laid on a substratum of concrete varying in thickness according to the nature of the soil or surface which it is proposed to cover; on a hard firm gravelly soil nothing more would be necessary than to loosen and form the surface to the required level or inclination and to mix with the loosened Material

a

a sufficient quantity of lime to
form a compact and durable
smooth surface; in a common earthy
soil a firm bed of concrete should be
laid 6 or 8 inches in depth, if the
ground is alluvial or marshy, it
may be necessary to go to the depth
of seven two or three feet with the
concrete; The surface being formed
for the reception of the bitumen, and
quite dry, rules of iron or hard wood made
to the thickness which it is proposed
to lay the material, and from three
to four inches in width are laid
on the concrete forming a square,
rectangular or other convenient figure
and which should not exceed an
area of from 20 to 30 square feet the
hot liquid bitumen is then poured
into the space enclosed by the rules.
and the surface brought to an uniform
thickness throughout and for which
the rules are a guide by means of
what is termed a "Knife" used very
hot, a fine grit or powdered lime or
chalk should be sifted evenly over
the surface and dressed down with
a wooden bat. care been taken
to work towards the joints. when
the bitumen is sufficiently

firm

from the rules are removed and three of them laid down to enclose a second area, the fourth side being bounded by the portion already laid, the hot bitumen is then laid in the second area, and finished off as before described, the joints must be completed carefully, and if a complete junction is not at first made a small quantity of the material is poured into the interstices, and neatly smoothed off with the hot knife

As the work proceeds two sides of one of the small figures may be bounded by portions already laid when of course two only of the rules will be required at last in a four sided figure.

The material is manufactured in blocks or cakes and when used required to be broken into peices and melted in an iron pot; whilst heating it must be kept constantly stirred from the bottom to prevent its burning when it attains the consistency of thick treacle, it is fit for use and is then to be ladled out with hot ladles and laid on covered

A

A common cast iron boiler will serve the purpose of melting the material, which must be fitted with a moveable grate for the fuel, but it will be more convenient to have the description of pot used by the Bastone Company and they will supply at a cost of about £10. or £12, together with the few implements required, the pot must be as near as possible to the spot where the material is to be used, in order that it may not cool in the transmit

The price of the bitumen from the Bastone Compy and which is here considered the best, is prepared with a certain proportion of grit intermixed and packed in convenient packages for exportation £4. 8. 0. per ton

Coke is commonly used for melting the bitumen but wood will answer the purpose

Royal Engineer Office
London District
28th April 1841.

— Covering for Roofs. —

Slates. have been imported from England at moderate prices and in the few instances in which they have been tried they have answered; there are Slate Quarries in various parts of the Province - but they have not as yet been worked. At present roofs are seldom or ever framed of Scantling that will enable them to bear the weight of Slates. —

Tiles. - have been made in the Brick yards but to no great extent; the quality good; the price high.

Tin. - Is the usual covering for roofs in the lower part of the Province, it is imported from England and procured at Quebec, Montreal, and the other principal towns in Canada, it lasts for many years, forms an excellent covering and is seldom in want of repair; - it is sold by the box, the price of a box of tin averages about 50/ per box the quality is what called I.C. - one box will cover 108. superficial feet of roofing -

the

the laying cost 5/ per box [illegible]
5½ lbs to a Square. Nails should be
have a lap or cover of three inches

Shingles are used throughout
Canada, and are every where
procured with facility they are
sold by the thousand; and are
made of Cedar or Pine, the former
are of the best quality a thousand
shingles will cover one square of
roofing the price is 8/ per thousand
for Cedar and the same for Pine
the laying will cost 4/ per thou-
sand including nails — Shingles
should have a lap or cover of
4 inches to the weather a good
workman should put on two
squares per day ———

Carpenters Materiels

Madawaska — Little Falls

Timber, in all the usual varieties of Canada is readily procurable in its rough state; but there are no Saw mills nearer than the Great Falls a distance of 36 miles —

Degelé

Timber, in its rough state can be procured here as at the Little Falls of the Madawaska the planks and deals must be sawn by the hand or brought from Riviere du Loup a distance of 52 miles; as with the exception of a short portage there is water communication between the Degelé and the Great Falls of the Saint Johns - planks or deals might be procured cheaper from thence than from Riviere du Loup —

Temiscouata.

Timber can be procured at the Madawaska and the Degelle, the deals from Riviere du Loup a distance of 36 miles —

Riviere du Loup

There are saw mills at this village. Timber and boards are plentiful —

Quebec

Timber and deals may be procured there in great abundance —

Three Rivers

The same remarks applies to Three Rivers.

Sorel

Sorel

It is reported that Cedar and Hemlock are abundant but of small scantling and that there are no saw-mills in the immediate neighbourhood

Montreal

Timber and deals are always readily procured, of any scantling or description

Chambly

Timber is scarce but boards of all descriptions are abundant

Saint Johns

Cedar & Hemlock timber is plentiful, but as sawn into scantlings not so.— boards are reported to be scarce

Isle Aux Noix

Timber and boards may be had from the neighbourhood

La - Prairie

Timber and plank must be brought from Montreal

Coteau du Lac

At the steam boat landing timber. planks, and boards, can be procured in any quantity

Line of the Rideau

There are numerous saw mills at By Town, Kingston mills, and other sites on the line of the Canal —

Timber in any quantity and of the best quality can be procured at the bay where it is collected for the timber merchants or from the rafts;- the timber most generally used for building both internally and externally is the red and white pine, it is easily wrought, and if kept painted is durable; the red is the strongest, but not so generally used.

used as the white, as it is found to warp, and the gum exudes from it when exposed to summer or stove heat= Cedar is used in all situations exposed to the weather, or damp. Ash & Elm, for framing in out buildings handles for tools &c.

Oak is of three varieties white, red, and black; - the white is of good quality and used in machinery & wheelers work also for door jambs lintels and other purposes where strength and durability are required.- The red oak is little used for building purposes but is manufactured into staves for the West India merchant.- The black oak, stands well under water.- Birch is little used except for hand rails and balusters of stair cases.- Beech is rarely used in buildings it is very susceptible of dry rot.- Hemlock is well calculated for piles or planking when used under water.- Tamerack furnishes excellent scaffolding poles.

Kingston.

Is from its proximity to the Rideau being only 6 miles from Kingston mills is well supplied with timber and boards;- there are also very extensive saw-mills at Gan=-anoqui 24 miles below Kingston on the Saint Lawrence from which Brockville, Prescott, and Cornwall are readily supplied

Toronto.

Timber and boards of good quality can be obtained in any quantity required

Hamilton

There is no difficulty in obtaining supplies of timber or boards at this Station

Penitanguishene

The oak is reported good but the pine of inferior quality

Niagara

No difficulty exists at this station in procuring timber and deals, for building purposes

Queenstown

The same may be said of Queenstown, - at Drummondville it is reported the supply of timber is sometimes deficient, but it may always be procured at an additional expence for conveyance from other points. -

Chippawa & Fort Erie

The same may be said of Chippawa & Fort Erie,

London

At this station oak and pine may be procured in any quantity likely to be required & almost of any scantling

Saint Thomas

The same may be said of Saint Thomas —

Amherstburg

Pine and boards cannot be procured near this place the general supply comes from the Black river mills at the head of the Saint Clair river in the State of Michigan, or from Otto Creek a distance of 150 miles on the shores of Lake Erie.

Sandwich & Windsor

The same difficulty exists with respect to procuring pine at these stations, as at Amherstburg but oak and black walnut may be obtained at all three stations —

Chatham

The same description of wood as that obtained at Amherstburg and the neighbouring

stations can be obtained here at an equal price, except pine timber which is of course dearer, as it must come from Otto Creek or from the United States. —

Ironmongery

Can be procured at Quebec, Montreal, Kingston, Toronto, and at all the towns in Canada, but generally of an inferior description, — Particularly locks, hinges and latches, — There are very good iron foundrys at Quebec, Three Rivers, Montreal Kingston, Toronto, Niagara Long Point London, St Thomas, Wood-hulls mills on the River Thames and Bolbourn Furnaces near Arnsbergstburg — at most of those places castings of any kind can be procured —

Glaziers Work.

Glass is imported from Great Britain cut into different sizes and packed in cases it is very seldom brought into this Country in crates. — That mostly used in the country is the 6-glass a Box of glass contains 50 superficial feet but sometimes the box has 100 feet in it and is sold according to the size of the frame; the price per frame varying from two pence to one Shilling and two pence. — it can be procured at all large towns no glass is imported from the United States. —

Painters Work.

Paints, Oils, and all the requisites for painters work are imported from Great Britain and may be procured at all the principal places in the Province —

Plumbers Work.

It generally not well performed the materials are imported from Great Briton sheet lead is very dear the price at Montreal being from 55/. to 60/. Shillings per Cwt wt.

Plumbers work is not much used in Canada:— The great range of temperature is detrimental to sheet lead when exposed to it.— Pumps are not generally used in consequence of the Frosts ———

General Observations upon Building in the Canadas

The season for work may be said to commence in May and to close in October; except under peculiar circumstances, masonary should not be carried on at a later season. The following is an account of an experiment tried at Quebec in the winter of 1826. ——

"A square brick column was constructed on a stone foundation in the Engineer yard during a temperature of 18° degrees below zero, it was 18 inches square and 8 feet high, and built of English grey stock bricks. the mortar was prepared with hot water and the trowels kept constantly warm, the Bricks were also warmed with a view of allowing some time for them to adhere to the mortar before freezing the joints were pointed in the best manner; it was allowed to stand for two years, and as the pointing appeared good it was supposed the

the work was also. — but on trying its strength it fell with a very slight pressure and the inside mortar was found in a pulverized state not adhering to the Bricks, which were uninjured

By subsequent experiments it has been found that building cannot be depended on at a later period than the 15th Novr. — pointing done after September has generally to be renewed in the following Spring. Brick chimneys which were built in the winter of 1837 are in 1841. in a state of ruin. .

At Montreal however the brick Cork house in rear of the temporary Barracks in the Quebec gate square, was commenced in October 1837. — it was only 14 days building. dry frosty weather the whole time so that the mortar which was made with boiling water froze quite dry nearly as fast as used

The

The Artillery Stables were commenced Building 22nd Nov.r 1837 and the brick work was finished in January 1838. as the frost had to be contended with: the mortar was boiled and set hard as soon as used.- The men principally worked with mitts on their hands.- so that the bricks are not very neatly laid and when once placed in their position could not be readily moved - the work had stood well and the walls do not appear to be affected by the weather.-

Timber can be procured very cheap and without any difficulty in almost every part of Canada, but on account of the great expense of sawing, scantlings are often used of a size and in a way that would not bear the test of scientific reasoning.- On the Rideau canal it is the practice to

Give

give the owner of a saw mill half the timber for cutting it —

In many parts of Canada it is usual for the person who employs artificers and labourers to board them —

Timber from 18" to 24" inches square is generally found to be the most sound and convertable the concentric rings shewn on the ends of such timber have frequently been counted and have been found to average from 100 on the smaller to 140 on the larger dimensions, which being allowed to be the respective ages of the timber will give what price as the best for cutting. the growth will of course vary with the nature of the soil that grown on high lands has the smallest rings and is consequently the strongest these remarks apply to pine timber. hard wood (say oak) would at least double the above ages. — the most favorable time with lumber men for cutting timber is from 1st Nov. to the 31st Dec.

the sap at that period being
quite down ——

The contract system
as adopted in England has
been tried at Montreal, Kingston,
and other places and there is
every reason to hope that the
attempt will be ultimately
successful although it cannot
be expected to work well at
its first commencement.
much of the work on the
frontier performed in conse-
quence of the revolt was cont-
racted for by Americans ——

Materials for Roads and Parades with some general observations on Road making.—

District below Quebec

From Quebec to Riviere du Loup en bas. the road is good and material abundant; across the Portage to Temiscouata, the road is not good, but materials are at hand for either macadamized, plank timber or Corderoy road; — the same may be said on the Madawaska and Saint Johns to the limits of Canada. ——

Quebec.

Materials for road making abound in this neighbourhood, but as yet little use has been made of them the common black Stone is the material

generally employed by the city authorities but it is quite unfit for making roads of a permanent kind. - Granite could be obtained in any quantity but it is seldom made use of - an excellent gravel for facades is to be had about two miles from the city, but the great distance it has to be drawn renders the using of it very expensive; it is not fit for public roads. —

Three Rivers

This is generally a sandy soil and the roads in the neighbourhood are good. —

Sorel

The soil is sand, and stone is very scarce. —

Montreal

There is an abundance of materials for making roads

&

and parades in part of the neigh=
=bourhood of this city; the lime
stone however which is the pre=
=vailing stone at this place very
soon pulverizes: there is a hard
dark stone found near Long Point
which it is thought would ans=
=swer better for road making
but its distance from Montreal
is a great bar to its general
use. the islands of St. Helens
produces excellent stone for
macadamizing; the slate rock
and gravel found there makes
a Capital parade.—

Chambly

There is a slate gravel found
here which is an excellent mat=
=erial for parades.—the stone
found in quarries is well ada=p=
=ted for making roads. ——

Saint Johns

This place abounds with
water washed pebbles which
when broken make an excellent
material—

material for roads but it is very expensive ——

La Prairie

There are excellent materials for roads and parades in this vicinity ——

Rideau Aux Lac

There is abundance of materials for forming roads and parades here ——

Line of the Ottawa Canal

Stone and gravel well calculated for road making are readily procured ——

Line of the Rideau Canal

By Town Portiveils, Isaac Jack Black Rapids Long Island, ——

Excellent materials for roads and parades can

be

be procured in the neighbourhood of these places, the Surface of the lime stone rock being exposed to the weather for ages, detached itself into small pieces of which a large quantity is to be found in the bed of the river below the dams and near By Town ——

Barrets, Nicholsons, Clows Merricks. Maitlands, Edmonds Old Mrs. Smiths Falls - First Rapids ——

Sand is generally used on these stations for repairing the roads, but excellent lime stone road metal can be procured at each of them ——

Kingston Mills

The lime stone quarried at this place would afford abundance of stone for Macadamizing but no gravel is procurable, - Shale and quarry rubble have with

difficulty been procured to construct the Locks. ——

Brewers Lower Mills

There is no gravel at this place ——

Brewers upther Mill.

A bank of disintigrated quartz and felspale mixed with earth is found at the distance of a few hundred yards from the locks at this place; the sand stone before mentioned could also be made use of if required.

Jone's Falls

There is a good gravel to be obtained at this place but it is failing in quantity, much of it having been used to form the dams &c. ——

Davis, Chaffeys. Estimates.

Desintigrated felspar and

and Crystaline Limestone is obtainable at these places

Narrows,

The debris of the sand stone is used for making roads at this place ——

Cornwall Prescott Brockville Gananoque and Districts behind the Saint Lawrence and the Rideau ——

The soil is a stiff clay with Boulders and some Sand on the road towards Dickensons landing

The soil is sandy towards Gananoque and the road passes over Granite rock 32 miles to Kingsville ——

Kingston

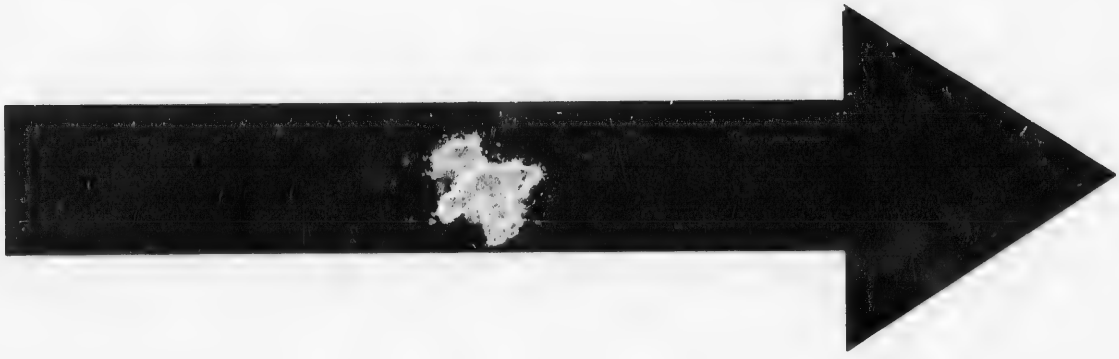
Both granite and Lime stone can be procured for road making at this place; the lime stone

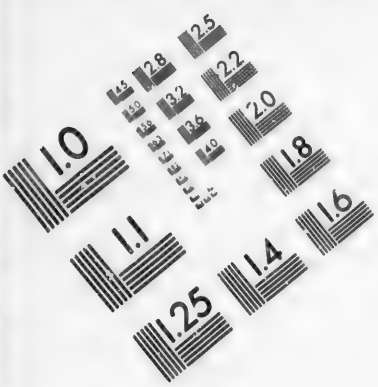
however is the material generally used for this purpose; it is ascertained that lime stone is often found very small mixed with the refuse of wood ashes and lime taken from the pot ash manufactories form good foot ways on Parades not subject to be cut up by horses, Carts &c.

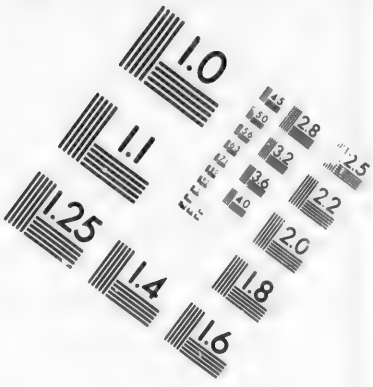
Toronto.

The materials procurable for making Parade and roads are rather scanty, at this place, there being no stone for breaking, but the granite boulders before spoken of & shingle and gravel can be obtained along the beach near the Garrison and for some distance beyond it but both are of an inferior quality the action of the rain and frost in a few years moulders them into a substance little better than clay.

Three miles out of Toronto on the direction of Kingston there is ten miles of boarded road. 16 ft. wide of 3 inch plank laid across the road upon longitudinal sleepers which are four feet from centre to centre and 5 & 6 inches scantling, the road is levelled







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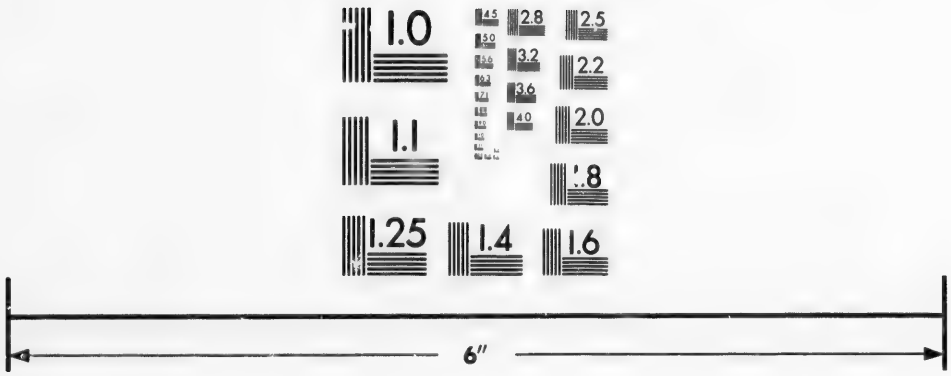

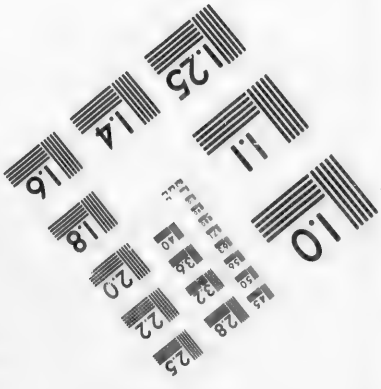

Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

and the sleepers sunk to form a good solid foundation; the planks are spiked with spikes 6 inches long one at each end and covered with about two inches of sand to lessen the wear. the expence of planking the road being previously formed including all materials is said to have been about £525. per mile it will probably last ten years during which period the repair may probably average £-50- per annum as for the five first and two last years of the ten little will be required ———

Hamilton

Materials for Macadamizing can be readily procured, but not gravel; the macadamized road near Hamilton on the route to London is reported to have cost nearly £3.000 per mile ———

Penetanguishene

The only road making materials at this place are granite boulders. ———

Niagara

Plenty of small hard grey pebbles from 2 to 9 inches diam=eter are found in the neighbour=hood, which when broken make good roads and parades there is also abundance of the best lake gravel to be had. —

Queenston

Broken sand stone & granit pebbles may be obtained there as well as good pit gravel all of which are well adapted for form=ming roads, parades, &c. —

Drummondville

Broken quarry stones and field granite pebbles are to be had in this vicinity for forming roads and parades —

Chippawa and Lyons Creek

Materials for forming roads and parades at these places cannot be procured nearer than Drummondville —

Fort Erie

Broken stone and pit gravel is found in abundance here. which would make good roads & Parades

London

Gravel at this place is expensive having to be taken from the bed of the river. which is one mile distant from the Barracks —

Saint Thomas

Gravel and shingle calculated for Road making are reported to be found at St. Thomas.

Amherstburg

Within a distance of 15. miles excellent gravel for forming Parades may

may be procured —

Sandwich

It is reported that no good materials for road making are to be found in the neighbourhood of Sandwich ——

Windsor and Chatham

The remarks upon Sandwich is applicable to Windsor and also to Chatham -

General Observations on Roads

Roads should wherever it is practicable be carried on a level; for a longer distance on a tolerably level surface will require less animal strength than a shorter line passing over considerable elevations

In the formation of the road the ground should be carefully levelled; pickets put in at every hundred feet, and section taken as a requisite precaution to prevent unnecessary excavations or embankments - the perfect draining of the road is an object of primary importance: without this precaution it is impossible to have a good sound road -

Roads in swampy ground are frequently made by laying young trees split through the middle 4" to 8" or 10" in diam^r close together in a transverse direction to the line of road. Such roads are called "corduroy".

In swamps or wet places for foundations, and also in repairing it is in Canada a frequent practice to use loose brushwood. This is wrong. the brushwood should be made into fascines or bavins and a Two good axemen will make from 15 to 24 feet lineal

of such road be a day; as the place when the trees are cut is near & or distant from the road. The material for those roads generaley cost nothing, and the wages of the men are from 2/6 to 3/6 Currency per day.

stake drivers through the centre to keep them firm.

The metal should be put on in thin layers, each layer having time to be well settled before the next was laid down. the first should be about five inches; - if the width of the road does not exceed 16 feet, and the traffic is not very heavy, a second layer of five inches will be sufficient. - but should the road be broader than 16 feet, or the traffic be great, three layers of four inches each will be necessary: -

The expense of forming Macadamized roads, confines them to the towns & the turnpike roads in their immediate vicinity.

If the width of the road is 16 feet the rise in the centre above that of the sides should be 2½ inches and in this proportion for roads of a greater or less breath. -

The usual method of opening new roads, when the settlers are limited to their own resources, is to cut down the trees so as to form an opening from ten to fifteen feet wide, and leave the stumps for

covering the surface of the road with sand, gravel or other loose materials prevents the angles of the stones from combining and caused the road to be hollow underneath

The price of stone for the macadamized road varies according to the description of materials and the facility with which it is procured; when granite boulders are abundant and

four or five years, when they can be more easily taken

and at no great distances, they are laid at the side of the road for about 50 yds on an average the toise of 216 feet the toise will weigh from 8 to 10 tons. the cost of breaking the boulders is from 30/ to 36/ per ton — Lime stone may be quarried at from 5/ to 7/ broken for 18/ and laid on the road for about 5/ the toise —

A good hand will earn from 7/6 to 10/ per diem an indifferent one not more than 5/6 per diem by breaking stones. —

Granite should be broken to 1½" in its diameter, sand or lime stone about 2½" inches —

The best macadamized roads are said to be made of three parts granite and one part lime or sand stone —

A macadamized road 16 feet wide with a two thickness of metal will require about 330 toises of broken stone 216 feet to the toise —

The cost of ditching draining forming the abutments, with

and the centre raised with the excavation from the ditches, and pounded, averages about £200 per mile, but to open such a road stone through wild land would cost £300. per mile, exclusive of bridges and

out in forming the road. The nature of the ground is studied more than the direct line, going round hills & swamps rather than over them. Twenty men with spades would make a mile of such a road in a day and it would be passable for oxen or sure footed horses with strong vehicles. It is commonly called a "Bush road".

When the road becomes established by law, "Road Verbal" the direction is straightened the road widened, the stumps taken out, and ditches dug at each side. The cost of the road when finished in this manner, 40 feet in width

with making the bed for the reception of the metal may under ordinary circumstances be calculated at £200 per mile; - this does not provide for covering hills: building bridges or cutting large lateral drains, which expense must of course vary greatly as to circumstances but in a distance of 20 miles may perhaps be averaged at £200 per mile thus we have an expence of say £600. per mile before we commence to put on the metal for which say 59/- per cube Yd. laid on we may add £1155. making a total of £1755. per mile.

The labour of one man will keep in order three miles of a well drained and well made road paying constant attention to raking the loose stones into the ruts, sweeping mud from the road opening water communication &c.

Timber roads as adopted in Russia have not been tried in Canada, there is little doubt but that they would answer equally well;

and cutting down hills or slopes of ravines. These roads constantly require repair, the expense of which it is difficult, (from the way in which the repairs are made) to ascertain. Every farmer in Canada keeps "his own road" or that which crosses the

front of his land in good order / or is supposed to do so / and as from the varied nature of the ground the labor falls very heavy on some & light on others, the average cost cannot be very correctly ascertained It cannot however be less than 180 or 200 days work per mile in a year at 3/4 or 3/6 per day. besides the repairs or renewals of bridges which are performed by the farmers collecting on a day appointed and putting all the bridges on their line of road in repair, an operation which is, in many parts, one that (as an instance) the Seigniory of Beauharnois

trees of either, pine, elm, oak, chesnut, cedar, or black ash, should be felled and roughly squared and sawn down the middle the reverse way thus giving two half trees of any required length or dimensions which being laid with the sawn side uppermost to form the surface of the road, these half trees are tree-nailed to sleepers buried in the earth or soil forming the foundation of the road – a mortice should be cut in the ends of the sleepers to admit the driving of a strong wedge to join the timbers which form the road together, dowels should be inserted between the half trees to keep them steady and the whole in a solid mass.–

The sleepers are of course laid the reverse way to the trees – a road of this description would not it is believed cost more than a plank road & would be made much more readily in a new country where saw mills are not established

it may be mentioned that in the some bridges across deep ravines near

the river St. Louis which had cost about £3000, (in all) were taken down, the farmers preferring to descend and ascend very steep hills at each of the crossings to spending 12 or 14 days every season endeavouring to keep the bridges in good order.

The original cost of a plank or timber road will be about one half less than that of a macadamized road, the repairs will be greater but in a period of ten years the expence of a plank or timber road will be about one third less.- they are less noisy, dusty and muddy than a macadamized road, cause less wear to the tire of wheels, and shoes of horses, are much less injurious to the horses feet, the carriages are also drawn with less labour to the animal, they may be formed of plank or timber of not much value for other purposes, can be rapidly made and the materials are always at hand ——

The calculation for keeping in repair the turnpike roads throughout England is £50. 18. 8½ per mile;- a calculation I have seen for Canada gives £50. 17. 6. for macadamized roads, & plank roads £70. 10 taken at an annual average for a period of eight years ——

Memorandum upon Artificers and other Tools

Broad & Narrow Axes. Adzes. Hammers Draw Knives and generally all Coopers and Wheelwrights Tools of the like description being of American manufacture, the former bear a much higher price, never less than 100 per Cent. and from being made of the best cast steel, certainly are more effective. the workmanship is handsomer and the make of the Tools better adapted for the work required here many of our Hardware merchants say that English workmen will not work to the patterns sent home, but make some slight alterations which destroys the Sale of the tools there is likewise a predilection for articles which are forged in Charcoal, altho it is believed, that all Tools made either in Canada or the United States are made of English Steel.

The workmen in Canada take a pride in the beauty of their Tools, and from earning such high wages are able to pay a greater price

chanics of a similar class in England Mr Harris our principal Hardware merchant in Toronto, has given the following information on the subject

Shopping Axes, if as good an article of Clothing as could be made in England, as it is manufactured in the States & Canada and at a lower rate, the consumption would be immense and increase every year the retail price of a Shopping Axe is 10/- & without the Handle.

Scythes an american improvement has lately been made in scythes but the price is 25 per cent higher in consequence. and altho' the quality is better, yet from the long established character of "Mowes" and "Biggins" scythes they are only making slow head against them, were the prices equal it is believed the american would have greatly the preference

Draw Knives of American manufacture fetch a higher price by 100 per cent than those of English make a canadian or american cutler charges from -/9 to 1/- 6d per inch

for them and from the quantity required for shingle making and for other works of a similar description there is a great demand

Hammers, with handles; those used by Carpenters here are usually of american manufacture. those of English manufacture of a similar pattern, sell at 2/6. 6d. each, whilst the American sell readily at from 3/3 to 7/6 each. the american article is made entirely of steel and beautifully finished - a merchant here sells 6 of american for 1 English hammer

Broad Axes - with handles for hewing timber, cost here retail from 20/ to 30/ shillings they are all of American manufacture ——

Coopers & Carpenters adzes, with handles of the same manufacture, are from 2 to 300 per cent dearer than the English and have a ready sale

Mill saws, the english are entirely out of the market the american sell at from 20 to 30 per cent higher than could ever be obtained for the English saws ——

Planes notwithstanding the English wood is better than the American yet the American planes with English Irons or Blades are almost universally preferred they are better finished and of a handsomer manufacture.

Brads & Tacks. The cut heads and cut tacks of American manufacture have completely superseded those of England. N. Scotia imports no English cut Brads or Tacks. the accompanying samples with the American manufactured may be seen in Canada. the prices of Brads are for

6 oz cut Tacks full count	6 pence
14 oz —— ditto	4½ pence

The Tacks vary in size from 2½ to 20 oz. to the thousand —

1½ in. fine Blue cut Brads	7½ d
1¼ " —— ditto	5
1 " —— ditto	4¾
¾ " —— ditto	4¼

Brads will not full count out Tacks — do.

Shades & Shovels of american manufacture are preferred from

their superior quality, to those of English manufacture notwithstanding the difference in the price English spades being sold at 3/6 to 4/- each retail whilst American can bring from 7/- to 10/- each.

A respectable storekeeper at Toronto sells from 6 to 8 Doz: american spades annually and the sale is increasing rapidly: some idea of the consumption of chopping axes in Canada may be formed from the fact that the same person sells from 100 to 300 dozen per annum every petty store in the country has them for sale, besides very many are made by the blacksmiths on the spot. a thousand dozen would be a very low Estimate for the annual consumption in Upper Canada

I count the Rebel who was a mere ordinary blacksmith residing near Lake Simcoe, had made and sold 500 axes in the course of one year; all by retail and taken from his smithy by the country people.-

To reduce Halifax Currency to Sterling divide by 6/4. —

Memorandum on the wages of workmen in Canada

Wages of workmen per day in Halifax currency

Stations	Masons	Bricklayers	Carpenters	Shinglers	Plasterers	Painters	Plumbers	Smiths	Labourers	Tinsmiths & Coppersmiths
Quebec District	6/-	6/-	5/-	4/6	6/-	6/-	8/-	5/-	2/6	6/-
Montreal — do —	6/-	6/-	6/-	4/-	6/-	6/-	8/-	6/-	2/6	6/6
Bytown — do —	6/9	6/9	6/-	4/6	7/6	6/3	12/-	6/6	3/3	7/6
Kingston Mills —	7/6	7/6	6/-	5/6	7/6	7/-	12/-	6/-	3/6	6/-
Kingston —	8/4	8/6	6/-	5/-	8/6	6/3	11/-	6/6	4/2	6/-
Toronto —	7/6	8/-	6/3	5/-	8/6	6/3	11/3	6/6	3/9	7/6
London —										
Chatham —										
Amherstburg —	7/6	8/-	6/3	5/-	8/6	6/3	11/-	7/6	3/9	7/6
Windsor —										
Sandwich —										
Niagara Frontier	6/3	7/6	6/3	5/-	8/-	6/3	11/-	7/6	2/6	7/6

The wages set down in the above table are those given to the best workmen.

Inferior workmen can be obtained at Quebec & Kingston, and sometimes at the other stations for lower rates of wages than those stated in the above table. On the Rideau Canal it is often difficult to obtain labour at any price and generally speaking a less rate of pay is given to workmen when employed in the winter than is paid to them during the summer months. and in most places in Canada Artificers and Labourers are rated under three different classes the wages decreasing from the 1st to 3d Class. It will be perceived that the wages of workmen of the same class vary very much at different stations for instance a first class labourer at Quebec gets 2/6 a day when at Kingston he would have 4/2 —

Memoranda of the prices of Building Materials in Canada

Description of Articles	Quebec	Montreal	St. Johns	Kingston	Toronto	
Building Stones delivered on the spot — Cap Rouge ashlers	9½	"	"	"	"	per foot Cube
Point aux Trembles do	1.5½	"	"	"	"	
Ange Gardien Rock	75.0	"	"	"	"	per Toise of 216 Cubic feet
do do walls	50.0	"	"	"	"	
Cap Rouge Rubble	50.0	"	"	"	"	
Limestone ashlers	"	8	"	5	"	per f. Cube
do for rubble	"	25.0	20.0	16.8	"	per Toise
do coursed work	"	"	"	21.0	"	— do —
Lake stones rubble	"	"	"	"	30.0	— do —
Boulders — do —	"	"	"	"	40.0	— do —
Queenston do	"	"	"	"	80.0	— do —
do ashlers	"	"	"	"	2.6	per foot Cube
Bricks — English grey stocks	100.0	"	"	"	"	per 1.000
do red do	50.0	"	"	"	"	— do —
Canadian flats	35.4	30.0	"	"	"	— do —
Fire	160.0	"	"	"	"	— do —
Toronto Stock	"	"	"	"	32 6	— do —
do common	"	"	"	"	25.0	— do —
Roach Lime	0-5¼	0-10	0-9	0-7½	1-4	per Bushel
River Sand	0-1¼	0-2½	0-1	0-2½	0-1¼	— do —
Castings of all Kinds	-3	-3	-3	3½	0-4½	per Lbs

cont:

Memorandum (continued)

Description of Articles	Quebec	Montreal	Kingston	Toronto		
Oak best square	2.6	1.6	1.5	1.6	0.9	per ft. Cube
Oak grey — do —	1.3	"	"	"	"	— do —
Pine red — do —	0.10	0.10	0.8½	0.8½	0.8	— do —
Pine white do —	0.6	0.6	0.4½	0.4½	0.2½	— do —
Ash — round —	0.8	0.10	0.5	0.4½	0.4	— do —
Cedar —— do —	0.5	0.5	0.4½	0.4½	0.5	— do —
Elm —— do. —	0.8	0.7½	0.6	"	"	— do —
Sawing Oak —	from 7.6	" to	"	10.0		per 100 ft. Sup.
Sawing Pine —	from 3.9	" to	"	6.3		— do —
Cedar Shingles	from 6.9	7.6	"	"		per 1000
Pine —— do —	from 7.0	8.3	"	"		— do —
Tin I.C. ——	from 50/	" to	"	60/		per Box 225 sheets
Glass best Newcastle.	from 45/	" to	"	65/		per Crate 175 Sup. ft.
Lead Sheet milled	from 45/	" to	"	55/		per Cwt. Nett